

Port-site infection following laparoscopic cholecystectomy

Port-site infection

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Abstract

Aim: The study aims to assess the rate of port-site infection after laparoscopic cholecystectomy.

Material and Methods: This descriptive study was conducted in the Department of Surgery at Prince Abdulaziz Bin MUSAAD Hospital in Arar, Saudi Arabia, over a 12-month period. Patients with symptomatic cholelithiasis undergoing laparoscopic cholecystectomy were included to assess the rate of port-site infection. SPSS version 20 was used to analyze data on diagnosis, port site infection, and demography.

Results: 270 patients with an average age of 38.06 underwent laparoscopic cholecystectomy, including 192 females and 78 males. Thirteen cases (4.81%) of port-site infection were found; most of them involved females (12). Acute cholecystitis cases (10/13) showed higher rates of infection ($p = 0.038$). The umbilical port was the port site that was most frequently infected ($p = 0.002$). High BMIs greater than 30 kg/m² were associated with 9 out of the 13 port site infections (69.2%), while 4 (30.7%) were associated with BMIs < 30 kg/m². ($p=0.01$)

Discussion: The rate of port-site infection is 4.8% after laparoscopic cholecystectomy. Surgery in the acute phase and a high body mass index are associated with an increased rate of infection at the umbilical port site.

Keywords

Laparoscopic Cholecystectomy (LC), Port-Site Infection (PSI), Cholecystitis

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Introduction

Modern surgical care has changed dramatically with the advent of laparoscopic surgery (LS). It has gained popularity among both surgeons and patients due to the reduced pain, speedy recovery, improved cosmesis, and decreased complications related to wounds [1].

Laparoscopic cholecystectomy is now considered the standard of care for symptomatic gallstones. This minimally invasive technique removes the gallbladder through relatively small abdominal incisions. Since 1987, when the first laparoscopic cholecystectomy was reported by Philips Mouret, this method has been successfully used for a wide range of abdominal, urological, and gynecological procedures [2].

Although laparoscopic cholecystectomy is generally believed to be a safe and effective procedure as compared to a traditional open cholecystectomy, one of its potential complications is port-site infection. It is described as an infection that occurs at the entry site of the laparoscopic instruments used during surgery. Port-site infection is not unusual after laparoscopic cholecystectomy. A systemic review of studies on perioperative antibiotic use in patients undergoing laparoscopic cholecystectomy revealed an infection rate of 2.4-5.2% [3]. Obesity, diabetes, advanced age, prolonged operative time, common bile duct stones, and conversion to open cholecystectomy are risk factors for port site infection (PSI) following LC [4].

According to Mukesh and colleagues' research, a wound infection rate of 3.71 was identified; in 1.71% of those cases, it was only superficial, and in the remaining 2%, it was deep [5]. The umbilical port was the most frequently affected port, as revealed by a meta-analysis comprising 19 studies. This is most likely due to many local microbes inhabiting the umbilicus [6].

Port-site infection is a disappointing complication that outweighs the advantages of minimally invasive surgery. It increases the patient's morbidity as well as damages the surgeon's reputation. Our aim is to assess the rate of infection at the port site after laparoscopic cholecystectomies in our setup.

Aims

To assess the rate of port-site infection after laparoscopic cholecystectomy.

Material and Methods

This prospective study was conducted over a 12-month period in the Department of Surgery at Prince Abdulaziz Bin Mosaad Hospital in Arar, Saudi Arabia. On admission, a complete history and physical examination, as well as the body mass index (BMI), were documented. To confirm the diagnosis, abdominal ultrasonography was performed. All male and female patients undergoing laparoscopic cholecystectomy for symptomatic gallstones were included. Patients with obstructive jaundice, pancreatitis, malignancy, and co-morbid conditions like cardiac or respiratory diseases, diabetes mellitus, and immunosuppression were excluded. After fulfilling the inclusion and exclusion criteria, 270 patients were included in the study. For participation in the study, written and informed consent was obtained.

All patients received an intravenous broad-spectrum antibiotic

prior to anesthesia induction. Under general anesthesia, a qualified consultant laparoscopic surgeon performed a laparoscopic cholecystectomy. The pneumoperitoneum was created using the closed technique. The gall bladder was removed via an epigastric port using retrieval bags. After removing the cannula, the port sites were washed with normal saline. Antibiotics were given to the patients for 48 hours. On the 1st day after operation, most patients were discharged. The third, seventh, and tenth postoperative days were used to monitor the patients for port-site infection and later, if necessary. After taking a swab and changing their dressing every other day, patients with port-site infections were advised to take antibiotics. Data regarding demography, diagnosis, and port site infection was entered on a proforma.

Statistical analysis

The analysis of all the data was done with SPSS version 20. The data was presented as percentages and numbers. To tabulate the data, frequency distribution was utilized. The significance level was evaluated at 5%. To determine the significance of the relationship between related variables, a Chi square test was used, and $P \leq 0.05$ was considered significant.

Ethical Approval

This study was approved by the Local committee of Bioethics (HAP-09-A-043) at Northern Border University (Date: 2022-11-17, No:15/44/H)

Results

This study included 270 cases of laparoscopic cholecystectomy over a period of 12 months. Males were 78 (28.9%) and females were 192 (71.1%). Participants were between the ages of 17 and 79, and the mean age was 38.06. The range of the body mass index was between 17.78 and 57.78. Most patients were obese (41.8%) and overweight (40%), whereas 17.8% were of normal weight as shown in Table.1. Thirteen patients out of a total of 270 patients (4.8%) developed port site infection (PSI) as depicted in Figure 1. Out of these 13 infected cases, 12 involved umbilical ports, while epigastric ports were involved in only one case ($p = 0.002$), which shows a significant relationship between umbilical ports and infection after laparoscopic cholecystectomy. Regarding gender, 12 out of 192 female patients developed PSI (6.25%), and one out of 78 male patients developed PSI (1.2%). The operative diagnosis was chronic cholecystitis in 138 cases and acute cholecystitis in 132 cases. The infection rate was higher in patients with acute cholecystitis (10), accounting for 76.92% of infected cases ($p = 0.03$), which is statistically significant as shown in Table.2.

When BMI is considered, 41.8% of people had a BMI of more than 30 kg/m². Nine out of the 13 port site infections were linked to high BMIs exceeding 30 kg/m², while four were linked to BMIs under 30 kg/m², which shows a significant relationship ($p = 0.01$) between high BMI and port site infection as shown in Table.2.

Discussion

Surgery has been completely transformed by laparoscopy, and laparoscopic cholecystectomy is now considered the standard of care for symptomatic gallstones [7]. Although the procedure has several benefits over open cholecystectomy, there are some

risks involved, such as port-site infection. Increased pain and longer hospital stays are linked to port-site infections, which may reduce the cost-effectiveness of this procedure.

In our study, 270 patients were included with age range of 17- 79 years with mean age 38.6. 71.1% of them were female, making up the majority. A study by Sultan in Iraq produced similar results verifying that majority (84%) of gallstone patients were female [8]. The body mass index was in the range of 17.78 to 57.78 in our study. Only 17.8% of the patients were of normal weight, with the majority being overweight (40%) and obese (41.8%).

The infection rate at the port site varies across different research studies, ranging from 2.4% to 6.7% after laparoscopic

cholecystectomy [9,10]. In our study, the infection was present in 13 out of 270 cases, with a rate of 4.8%. This is comparable to a rate of 4.5% reported by Al-Naser (Iraq) [11]. A high infection rate (6%) was reported in Pakistan by Javeria et al. [12].

In a case-control study by Sajid comparing open and laparoscopic cholecystectomy, the reported port-site infection rate was around 1.6% in the laparoscopic group [13]. An infection rate of 2.2% was shown by Ganpathi et al. in another study that compared glove closure versus stitch closure of 5-mm ports in laparoscopic cholecystectomy [14]. In a Siddiqui and Tai randomized controlled trial comparing various skin closure techniques for laparoscopic ports, 1.5% of port site infections were reported [15].

The most frequently infected port site was the umbilical port, which was infected in 12 cases (92.3%) in our study. Epigastric port sites were infected in one case (7.7%) only. These results are like the study of Ravindranath GG et al. where umbilical port was the most infected port site (52.4%) [16]. Although an epigastric port was used for the retrieval of gall bladders in our study, the rate of infection was minimal, which could be attributed to the use of an endoglove for gallbladder extraction. The operative diagnosis in our study was chronic cholecystitis in 132 cases and acute cholecystitis in 138 patients. The rate of infection at the port site was higher in cases of acute cholecystitis (9), accounting for 69.2% of the port site infection rates, which is statistically significant ($p = 0.038$). A study conducted at the DHQ hospital in Mirpur yielded similar results, indicating a port-site infection rate of 7.1%. Most port-site infections were linked to acute cases, with a 65:35 ratios between acute and chronic cases [17]. Similarly, 60% of port-site infections were seen in cases of acute cholecystitis, according to a study conducted by Naeem (2012) [18]. This may be caused by the gallbladder becoming edematous and having thick walls, or by bile or stones spilling out [19].

In terms of gender, PSI occurred in 12 of 13 (6.25%) female patients and one of 78 (1.2%) males. Females made up 12 of the 13 PSI cases, accounting for 92.3%. Similar results were observed in a study by Ahmed [20], which included 65.17% female patients and 34.83% male patients, with PSI being more common in female patients (7 out of 9 patients).

When we consider BMI, 40% of the patients were overweight and 41.8% were obese. Four of the 13 port site infections were found in overweight patients, while nine were found in obese patients. This shows a significant relationship between

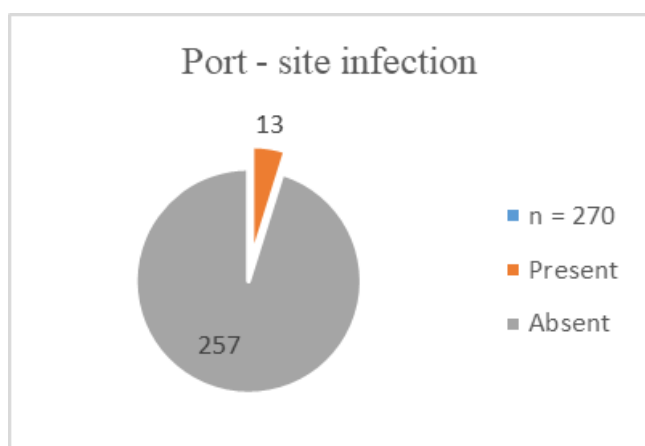


Figure 1. Rate of port-site infection

Table 1. Demographic data of participants (n=270)

Parameters	Frequency	Percentage (%)
Age	Age < 40	165 (61.1 %)
	Age ≥ 40	105 (38.9 %)
Gender	Male	78 (28.9 %)
	Female	192 (71.1 %)
Port site	Umbilical	12 (4.4 %)
	Epigastric	1 (0.4 %)
Diagnosis	Chronic cholecystitis	138 (51.1 %)
	Acute cholecystitis	132 (48.9 %)
Body mass index (BMI)	Underweight	1 (0.4 %)
	Ideal	48 (17.8 %)
	Overweight	108 (40 %)
	Obese	113 (41.8 %)

Table 2. Relationship between various parameters and port-site infection (n=270)

Parameters	Port site infection				p value
	Yes	Percentage (%)	No	Percentage (%)	
Gender	Male	1 (1.2 %)	77 (98.8 %)	0.08	
	Female	12 (6.25 %)	180 (93.75 %)		
Port site	Umbilical	12 (4.4 %)	258 (95.6 %)	0.002	
	Epigastric	1 (0.4 %)	269 (99.6 %)		
Diagnosis	Chronic cholecystitis	3 (2.17 %)	135 (97.83 %)	0.038	
	Acute cholecystitis	10 (7.58 %)	122 (92.42 %)		
Body mass index (BMI)	BMI <30Kg/m ²	4 (2.5 %)	153 (97.5 %)	0.01	
	BMI >30Kg/m ²	9 (7.96 %)	104 (92.04 %)		

obesity and port-site infection ($p = 0.01$). Similar outcomes were observed in Arvind's study, where patients with high BMIs ($>30 \text{ kg/m}^2$) experienced difficulties during the extraction of their gall bladders, causing bile and stones to leak out. There was a correlation between high BMI and port-site infection, as evidenced by the fact that three patients with low BMIs and ten with high BMIs experienced infection [21].

Conclusion

The rate of port-site infection is 4.8% after laparoscopic cholecystectomy. Surgery in the acute phase and a high body mass index are associated with an increased rate of infection at the umbilical port site.

Recommendation

Surgery in the acute phase and a high body mass index increase the risk of infection at the umbilical port site. Although the risk of infection at the port site is low after laparoscopic cholecystectomy, it can be avoided by carefully selecting cases and adhering to basic laparoscopic techniques.

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Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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Conflict of Interest

The authors declare that there is no conflict of interest.

References

- Garpis N, Dimitroulis D, Garpis A, Diamantis E, Spartalis E, Schizas D, et al. Enhanced recovery after surgery: is it time to change our strategy regarding laparoscopic colectomy? *In Vivo*. 2019;33(3):669-74.
- Mehraj A, Naqwi NA, Feroz SH, Rasheed H. Laparoscopic cholecystectomy: An audit of 500 patients. *J Ayub Med Coll Abbottabad*. 2011;23(4):88-90.
- Pasquali S, Boal M, Griffiths EA, Alderson D, Vohra RS; CholeS study group; West midlands research collaborative. Meta-analysis of perioperative antibiotics in patients undergoing laparoscopic cholecystectomy. *Br J Surg*. 2016;103(1):27-34.
- Sasmal PK, Mishra TS, Rath S, Meher S, Mohapatra D. Port site infection in laparoscopic surgery: A review of its management. *World J Clin Cases*. 2015;3(10):864-71.
- Sangwan MK, Sangwan V, Garg MK, Singla D. Infection of port holes may lick the coveted goals: A surgical audit of port site infections in 700 cases of laparoscopic cholecystectomy. *International Journal of Surgery Science*. 2019;3(2):82-5.
- Mukherjee R, Sengupta S, Bose S. A Critical Appraisal of Port Site Infections: Meta-Analysis of Existing Contemporary Data. *J Surg Transplant Sci*. 2018;6(1):1065.
- Memon RJ, Qureshi ZZ, Shah FH, Laghari M. Port Site related complication and their management in patients undergoing Laparoscopic Cholecystectomy. *JIMDC*. 2018; 7(3):208-12.
- Sultan A, Ali S, Ghareeb O. Port site consequences after laparoscopic cholecystectomy using an open versus closed approach of Pneumoperitoneum. *Cureus*. 2022;14(7):e26499.
- Saud JD, Al-Hail MCA. Surgical site infection after laparoscopic cholecystectomy. *Bas J Surg*. 2010;16:119-21.
- Mir M, Khurshed S, Malik U, Bali B. Frequency and risk factor assessment of port-site infection after elective laparoscopic cholecystectomy in low-risk patients at a tertiary care hospital of Kashmir. *The Internet Journal of Surgery*. 2012;28(2):1-5.
- Al-Naser KH. Port Site Infections After Laparoscopic Cholecystectomy. *Int J Med Res Health Sci*. 2017;6(6):132-7.

- Uaman J, Janjua A, Ahmed K. The frequency of port-site infection in laparoscopic cholecystectomies. *P J M H S*. 2016;10(4):1324-6.
- Sajid MS, Khan MA, Ray K, Leaver C, Hamilton A, Sayegh M. Laparoscopic versus open cholecystectomy: A case-controlled study of outcomes. *Saudi J Gastroenterol*. 2010;16(3):182-7.
- Ganpathi IS, Muruganandan B, Sathuragan P. Prospective randomized study comparing stitch versus glove closure of 5-mm ports in laparoscopic cholecystectomy. *J Minimal Access Surg*. 2012;8(3):77-80.
- Siddiqui MR, Tai MY. A randomized controlled trial comparing skin closure in laparoscopic ports. *J Minimal Access Surg*. 2013;9(4):133-7.
- Ravindranath G, Reddy S. Laparoscopic port site complications: A study in a tertiary care center. *Int Surg J*. 2016;3(3):1121-4.
- Jan WA, Ali IS, Shah NA, Ghani A, Khan M, Khan AS. "The frequency of port-site infection in laparoscopic cholecystectomies." *J Postgrad Med Inst [Internet]*. 2011;22(1).
- Taj MN, Iqbal Y, Akbar Z. Frequency and prevention of laparoscopic port site infection. *J Ayub Med Coll Abbottabad*. 2012;24(3-4):197-9.
- Zinner, Michael J. *Maingot's abdominal operations*. McGraw-Hill Publications. 2009.p.1004-1006.
- Ahmed J, Verma R. Port Site Infections following Laparoscopic Cholecystectomy. *IOSR-JDMS*. 2022;21(3):20-4.
- Kumar A, Sharma K, James J. Port site infections after elective laparoscopic chole-cystectomy at a tertiary care centre of Jharkhand: A Prospective Observational Study. *Ann Surg Perioper Care*. 2023;8(1):1057.

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